# Writing Requirements

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# Overview

- **Reviewing Scenarios**

- **Requirements Document (Outline)**

- **Requirements Check List**

- **Sample Requirements**

# Reviewing Scenarios

| | | |
|---|---|---|
| * | Scenario ID | The SID is the same as the document number in the Doc DB. |
| | Author | Who developed (thought up) the scenario. |
| | Date | Approximate date of when the scenario was developed<br>Example: 19-May-2005 |
| * | Reviewers | Committee members who reviewed the scenario. |
| * | Reviewed | Date |
| * | Approved | Date |
| | Goal | Short, active verb phrase that describes the scenario. |
| | Level | Best guess whether this is a high level, mid-level, or low level scenario.<br>Examples:<br>1) high level: run a shift in the remote operations center<br>2) mid-level: locate and contact a CMS detector expert<br>3) low level: find CMS detector expert in a directory |

**\* Updated fields in the Scenario Template (Doc #113).**

# Requirements Document

## 1. Introduction

An overview of the Remote Center at Fermilab (RCF), why it is needed, what role it will have in commissioning and operating LHC and CMS, key concepts, name of this requirements effort, and a description of assumptions. The introduction should also include a brief overview of the sections in this document.

Remote Center as an extension of the LHC CCC and CMS MCR.

Remote Center as a communications hub.

An explanation of why we treat CMS and LHC separately, and an explanation of the "combined" requirements.

## 2. Assumptions

A list of assumptions (numbered?) for the development of requirements. Since we seem to be somewhat ahead of what has been decided for LHC and CMS operations we should explain what we have assumed while developing requirements. This list may change as assumptions are confirmed as being part of the plan.

## 3. Actors

A list of actors, and a description of the actors. This may consist of two lists, one for accelerator scenarios, and one for detector scenarios.

## 4. Scenarios

A sample scenario, and how the requirements are extracted from the scenario.

A description of how the scenarios are managed, the numbering system, and how this feeds into the numbering for requirements.

# Requirements Document (cont.)

## 5. High-Level Requirements

Explanation of how the requirements are organized and a description of the numbering scheme. For example, AR-1.2 is an accelerator requirement in Section 5.1.1 of this document, and it is requirement #2 in that section. "DR" is a detector requirement. We may need to introduce the concept of dependencies, and these would be labeled as DD and AD for detector and accelerator dependencies, respectively.

We also have a scenario ID (SID) that will be referenced. Therefore, a complete requirement number may look something like "AR-1.2[137]", where the "137" refers to a particular scenario. This gets a bit more complicated when multiple scenarios are references, which might be indicated as [137][148], or [137+].

### 5.1. CMS Detector

#### 5.1.1. Commissioning Requirements

Requirements for near and mid-term commissioning and testing for CMS.

#### 5.1.2. Additional Requirements for CMS Operations

Additional requirements that are needed for CMS operations. These may be implemented at a later time, thereby influencing the schedule for the Remote Center.

# Requirements Document (cont.)

## 5.2. LHC Accelerator

### 5.2.1. Commissioning Requirements

Requirements for near and mid-term commissioning (hardware & beam commissioning) for LHC.

### 5.2.2. Additional Requirements for LHC Operations

Additional requirements that are needed for LHC operations. As with the CMS operations requirements, this may be implemented at a later date (i.e. later in the schedule for the Remote Operations Center)

## 5.3. Combined CMS and LHC Requirements

Requirements that involve both the detector and accelerator.

# Requirements Document (cont.)

## 6. Audiovisual Communications Requirements

## 7. Safety Requirements

Electrical safety, Ergonomics?

## 8. Security Requirements

This could include both network security, and security for a separate room that might be used to access computing resources inside the CERN firewall.

## 9. Software Requirements

Requirements for any software that is developed as part of the Remote Operations Center.

## 10. Dependencies

This section is used to indicate any dependencies that we have on something that is outside of our control. This section is expected to be distinct from the "assumptions" that we make as we develop our requirements.

## 11. Scenario Appendices

### 11.1. CMS Detector Scenarios

### 11.2. LHC Accelerator Scenarios

### 11.3. Combined CMS and LHC Scenarios

# Requirements Check List

For each requirement ask the following:

- Is it understandable?

- Is it as short as it can be?

- Does it apply to a defined type of user (or actor)?

- Is it verifiable?

- Is it a single requirement?

- Does it refer to one or more scenarios using the SID(s)?

# Sample Scenario Revisited

Goal: Run a "normal" CMS data-monitoring shift at FNAL

Actors: CMS shift coordinator (SC), CMS monitoring coordinator (MC), CMS monitoring coordinator at FNAL (MCF)

Trigger: The SC delegates responsibility for data monitoring to a monitoring coordinator at FNAL.

Assumptions:

- A CMS shift coordinator will be located at the CMS Control Room for each CMS shift. The shift coordinator is responsible for everything that occurs during a shift.
- We will run shifts at the Remote Center at Fermilab (RCF). Neither the duration nor the frequency of RCF shifts has been determined.
- The RCF will have display hardware (referred to as the Display System) that will be capable of showing at least as much monitoring information as the display hardware located in the CMS Control Room.

# Sample Requirements

Requirements:

- The monitoring coordinator at Fermilab (MCF) will be accountable to the CMS shift coordinator (SC) in the same manner that a monitoring coordinator at CERN will be accountable to the SC.
- The MCF will announce (to the SC) his or her arrival at the Remote Center at Fermilab (RCF) before the start of a shift.
- The MCF will arrive at the RCF with enough time before a shift to review monitoring information, review electronic logbook entries, and consult with the monitoring coordinator (MC) from the previous shift.
- The MCF will have access to an "always-on" audiovisual communications link for communication with the SC during a shift.
- The MCF will have simultaneous audiovisual communications access to the SC and the MC from the previous shift, until the MC has been relieved of his or her shift responsibilities.
- The MCF will acknowledge responsibility for CMS data monitoring for the duration of the shift.
- The MCF will have priority on how the RCF Display System is used during the shift.

# Sample Requirements

Requirements:

- The MCF will have access to the same monitoring information (histograms, alarm signals, electronic logbooks, etc.) that are available to an MC located at CERN.

- When a run period has been completed, the SC and the MCF record their assessment of the detector status and data quality for the run period according to CMS procedures.

- At the end of a shift, the MCF will remain in the RCF until the SC has relieved the MCF of CMS data monitoring responsibilities.

- The MCF will have simultaneous audiovisual communications access to the SC and the MC from the following shift, until the MCF has been relieved of his or her shift responsibilities.

Note: Requirements on the audiovisual communications hardware and software will be presented in a separate section of the Requirements Document.